Effective treatment of periodontal problem areas

Combined therapy

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_Introduction

In systematic periodontal therapy, furcation treatment is still quite a challenge for the dentist. Because of the difficulties in the handling of this special treatment area, various therapy approaches have been discussed over the past few years. For instance, the combined use of laser and gradually released chlorhexidine xanthan gel supports the remission of inflammation considerably.

Periodontal disease has become an endemic disease in countries with a Western way of life. Over 50 % of adults in Germany between 35 and 45 years of age suffer from moderately severe periodontitis. Today, periodontal disease poses the highest threat to general dental health and is responsible for premature loss of teeth in affected patients (Renggli 2010), which certainly implicates a substantial loss of quality of life.

In the afore-mentioned age group, the periodontal bone resorption usually extends to more than one-third of the total root length and spreads evenly horizontally. Therefore, an orthopantomogram or X-ray can be used for initial diagnosis. A detailed patient anamnesis and a corresponding patient-oriented prevention and therapy plan are essential prior to periodontal treatment. Periodontal treatment represents a wide field in daily dentistry, and can only be completed successfully if the dentist, the patient and the dental assistants cooperate.

_The role of oral micro-organisms

In the multifactorial aetiopathogenesis of periodontopathies, a decisive role is attributed to oral micro-organisms. The oral flora features a natural balance between various micro-organisms, and each patient has an individual oral flora. Therefore,

Fig. 1_Generalised horizontal and vertical premature bone resorption in a 37-year-old patient.
Fig. 2_Probing and pocket depth measurement.

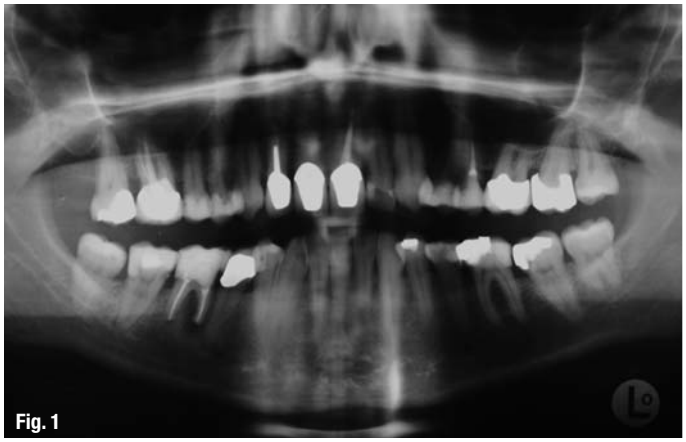
Fig. 1


Fig. 2


Fig. 3


Fig. 4

Fig. 3_Scaling and root planing.
Fig. 4_Flexible laser fibre in the pocket area, ensuring diffuse dispersion of laser light in the surrounding tissue.

the existence of periodontal pathogenic micro-organisms alone is not likely to lead to an outbreak of periodontopathies. As a result, its therapy concentrates on the reduction of pathogenic bacteria through mechanical therapy (Renggli 2011).

However, bacteria such as *Porphyromonas gingivalis, Tannerella forsythia, Fusobacterium species, Aggregatibacter actinomycetemcomitans, Prevotella intermedia* and *Prevotella oralis* cannot be eliminated by initial treatment or surgical therapy alone: deep pockets with a complex root anatomy can complicate the access of periodontal instruments to all diseased areas. Even the wide selection of slim and anatomically shaped curettes and scalers often does not allow an efficient therapy in the bi- and trifurcation areas of molars, since various pathogenic micro-organisms penetrate into the tissue and thus cannot be removed by mechanical cleaning. The persistency of periodontal pathogenic species especially, such as *A. actinomycetemcomitans* and *P. gingivalis*, appears to be an important factor for the progress of chronic periodontitis.

_New opportunities: Non-surgical treatment

A paradigm shift in periodontal treatment in recent years resulted in the prioritisation of non-surgical treatment of pockets with a medium depth (4–5 mm). This characterises the majority of patients suffering from periodontal disease. In this regard, the introduction of laser techniques into periodontology offers interesting new perspectives and should form part of the treatment spectrum of today's practitioner. Dental laser devices demonstrate clear advantages, especially in combination with scaling and root planing.

Sub-gingival plaque is the main factor for the development of periodontitis: tartar plays an important role as a retention area for the colonisation of micro-organisms. Loose bacterial deposits—non-adhesive plaque (swimmer's calculus)—nearly exclusively consisting of Gram-negative anaerobes, colonise the soft tissue of the pockets. Their number rapidly increases in acute phases, which appears to be an important factor for the progress of periodontitis.

Chlorhexidine can be of help in fighting periodontitis (Lundergan 1992). Every dentist knows the extremely advantageous bactericidal effect of chlorhexidine bis-gluconate from his or her years of study. Local delivery devices for improving application in deep pockets through longer exposure were tested years ago already. These are used with great success in treating periodontal disease (Sellmann 2011).

_Chlorhexidine xanthan gel

In patients with furcation involvement, I use a chlorhexidine xanthan gel (ChloSite Periodontal Treatment Gel by Ghimas), which is a typical example of a local delivery device. According to the manufacturer, ChloSite consists of 1.5% chlorhexidine bonded in a xanthan carrier substance. It contains chlorhexidine in two different forms. The first form is 0.5 % highly soluble chlorhexidine digluconate, also called chlorhexidine-bis(D-gluconate). This is the form of chlorhexidine used as an antiseptic agent mainly in dentistry. The second form is slow-release 1 % chlorhexidine dihydrochloride (a bis-biguanide with bacteriostatic characteristics). Chlorhexidine digluconate in this composition has an immediate bactericidal effect, while chlorhexidine dihydrochloride provides controlled delayed disinfection.

Substantivity is the ability of an agent to build a reservoir by bonding to the adjacent hard- or soft-tissue walls of a gingival pocket. For achieving the desired substantivity using a local delivery device with a high sulcus fluid flow rate of 40 ml/hour to

renew the content of a periodontal pocket, carriers which guarantee maximum retention time in the pocket are required. For this purpose, ChloSite uses xanthan gel as the carrier. Xanthan is a natural thickening and gelling agent. It is extracted from sugar-containing substrates by means of bacteria of the Xanthomonas species. Xanthan usually cannot be metabolised, or it is metabolised only to a very low level. For this reason, it belongs to the category of fibres and represents no health hazard. It swells in a watery solution, thus increasing the viscosity of the substance dissolved in it, in our case the two forms of chlorhexidine. It is used as a thickening agent in food, for example in dairy products, gravies, ketchup, etc. A special feature of xanthan solutions is their pseudo-yield point.

When exposed to fluids, xanthan forms a 3-D, pseudo-elastic net (reticulum), in which bactericidal substances can be embedded. This is followed by a controlled release, depending on the specific physical and chemical characteristics. According to the manufacturer, xanthan in ChloSite provides good sub-gingival bonding of the local delivery device, while the high chlorhexidine content guarantees a safe bactericidal effect. Special galenics secure the controlled delayed release into the biofilm.

ChloSite's composition has been scientifically proven to allow the chlorhexidine to remain in the treated pocket area for two to three weeks (Sellmann 2011). In this period, chlorhexidine is released as the gel degrades, thus continuously and efficiently fighting bacteria.

_Dental laser systems

Within the past few years, various dental laser systems have gained prominence in the therapy of periodontitis (Bach 2007). Although laser can only be viewed as complementary to conventional systematic therapy, it has expanded the range of non-surgical periodontal therapies. Before laser can be applied, the patient has to be prepared by comprehensive initial therapy. The latest developments in the field of laser techniques have made the removal of calculus with the help of a laser conceivable, since the choice of a particular wavelength can result in a favourable bactericidal effect. Numerous studies and publications in various fields of dentistry have proven that lasers have an excellent antibacterial effect in the infra-red area and that they are able to deactivate bacterial toxins. This effect is achieved already at a power output clearly below the limit of thermal damage to soft and hard tissue. Thin and flexible light conductor systems allow the laser radiation to be applied in almost any area, even the bifurcation area of molars. Therefore, the use of laser for systematic periodontal therapy can be recommended. If the power output is increased, even infected pocket epithelium can be removed by means of an Er:YAG, Nd:YAG or diode laser. Therefore, pocket decontamination by laser is very effective, even in cases of acute local periodontitis.

_Clinical treatment procedure

The clinical treatment procedure in my dental practice is as follows:

- use of ultrasonic devices on enamel surfaces to remove mineralised plaque (tartar) and sub-gingival calculus;
- use of ultrasonic scalers on root dentine for systematic treatment of the root surface;
- mechanical root planing with hand instruments;
- finishing, scaling and root planing with hand instruments with fine tactility;
- final rinsing with chlorhexidine;
- pocket decontamination with laser, for which flexible fibres are indispensable in the furcation area;
- in few individual clinical cases, external gingivectomy and removal of gingival hyperplasia to reduce extremely deep periodontal pockets;

Fig. 5_ChloSite Perio Protection Gel package.
Fig. 6_Atraumatic instillation of ChloSite in the bifurcation area with a rounded and laterally open cannula.

Fig. 5


Fig. 6

Fig. 7

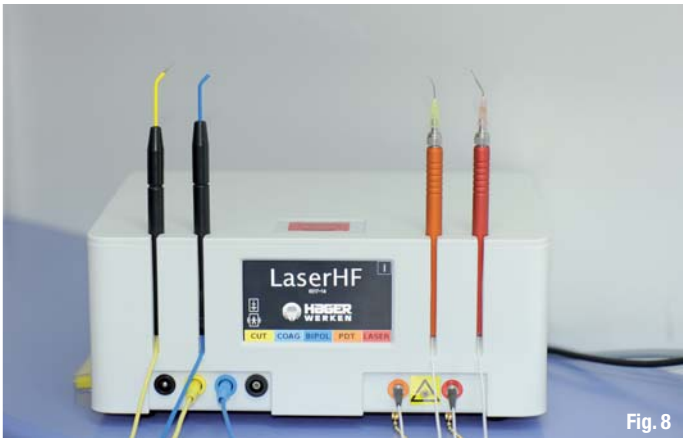

Fig. 8

Fig. 7_Application syringes containing chlorhexidine xanthan gel.
Fig. 8_LaserHF (Hager & Werken): the only combination device in the world with two laser units (975 nm/6 W and 660 nm/25–100 W) and a high-frequency surgery component (2.2 mHz) for easy, fast and precise cutting of soft tissue.

– application of ChloSite gel via the rounded and laterally open cannula included, without traumatisation of the soft tissue surrounding the pocket.

On the one hand, the immediate bactericidal effect of laser application guarantees optimal wound healing. On the other hand, the release of chlorhexidine in the pocket allows both bacterial reduction for a minimum of 15 to 20 days and the prevention of new bacterial growth. The effectiveness of this treatment method is evident in the pain-free wound healing without irritation or bleeding, which is very positively evaluated by the patient. In my experience, a single treatment reduces the depths of the diseased pockets by approximately 2 to 2.5 mm per pocket. Another important clinical advantage of applying chlorhexidine xanthan gel in the periodontal pockets compared with full-mouth disinfection or pocket rinsing with chlorhexidine is that such side-effects as a black hairy tongue, the deactivation of fibroblasts in regeneration treatment, dysgeusia and chlorhexidine staining on composite fillings do not occur.

_Conclusion

Using chlorhexidine xanthan gel in the form of ChloSite gel and laser in combination with systematic periodontal treatment can increase treatment success and improve the clinical healing process for the patient. Especially in the difficult-to-access bi- and trifurcation areas of the molars, the gel can be applied in a pain-free manner for the patient and without difficulty for the dentist. An adjuvant administration of antibiotics with the corresponding systemic side-effects becomes obsolete in nearly all cases. From my point of view, this supportive therapy alternative is an up-to-date periodontal treatment method, featuring a reduction in treatment time, an uncomplicated healing process and the prevention of undesirable side-effects. The prevention of premature administration of antibiotics has to be taken into consideration in particular, especially in light of the development of increasing resistance to antibiotics worldwide.

Furthermore, it is of great importance for the dentist to use therapy methods that promote the regeneration of periodontal soft and hard tissue. It also has to be pointed out that the therapy may be repeated several times without any problems in the case of persistent furcation infection and very deep pockets, thus slowly and successively obtaining a measurable reduction of the clinical pocket depth._

Editorial note: A complete list of references is available from the author.

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Fig. 9

Fig. 9_Logically arranged colour touch-screen display.